Wauseon, and the least, 1.28, at St. Ignatius College (Cleveland).—*H. W. Richardson.*

Oklahoma.—The mean temperature was 59.9°; the highest was 97°, at Norman on the 20th, and the lowest, 28°, at Pond Creek on the 9th. The average precipitation was 5.38; the greatest monthly amount, 13.35, occurred at Edmonton, and the least, 0.80, at Fort Sill.—*J. I. Widmeyer.*

Oregon.—The mean temperature was 51.8°, or 4.0° above normal; the highest was 100°, at Vernonia on the 25th, and the lowest, 10°, at Fort Klamath on the 2d. The average precipitation was 1.84, or 1.95 below normal; the greatest monthly amount, 5.50, occurred at Government Camp, and the least, 0.15, at P. Ranch.—*B. S. Pague.*

Pennsylvania.—The mean temperature was 49.0°, or 1.1° above normal; the highest was 92°, at Gettysburg on the 25th, and the lowest, 12°, at Blooming Grove on the 20th. The average precipitation was 3.30, or 0.50 below normal; the greatest monthly amount, 4.63, occurred at Uniontown, and the least, 1.20, at Easton.—*T. F. Townsend.*

South Carolina.—The mean temperature was 62.2°, or 0.6° below normal; the highest was 95°, at Gillisonville on the 28th, and the lowest, 31°, at Walhalla on the 17th. The average precipitation was 3.24, or 0.10 above normal; the greatest monthly amount, 8.40, occurred at Walhalla, and the least, 1.41, at Gillisonville.—*J. W. Bauer.*

South Dakota.—The mean temperature was 44.7°, or 1.0° below normal; the highest was 91°, at Aberdeen and Mellette on the 27th, and the lowest, 10°, at Fort Meade on the 1st. The average precipitation was 2.95, or 0.40 above normal; the greatest monthly amount, 6.13, occurred at Greenwood, and the least, 0.60, at Farmingdale.—*S. W. Glenn.*

Tennessee.—The mean temperature was 58.1°, or 1.5° below normal; the highest was 88°, at Springdale on the 24th, at St. Joseph on the 27th, and at Byrdstown on the 28th; the lowest was 25°, at Erasmus on the 10th. The average precipitation was 6.18, or 1.83 above normal; the greatest monthly amount, 9.41, occurred at McKenzie, and the least, 2.84, at Elizabethton.—*H. C. Bate.*

Texas.—The mean temperature was 1.6° below normal; there was a general deficiency, except in the vicinity of Camp Eagle Pass and El Paso, where there was an excess of 1.9° and 0.5°, respectively; the deficiency ranged from 0.8° to 2.5° over northern and eastern sections, from 1.1° to 3.6° over central and southwest sections, and from 0.1° to 4.9° over the coast district, with the greatest deficit in the vicinity of Cuero; the highest was 101°, at Camp Eagle Pass on the 5th, and the lowest, 26°, at Valentine on the 1st. The average precipitation was 0.98 below normal; there was a general deficiency, except over the western part of the southwest section, the Panhandle, and in the vicinity of Luling and Cuero, where there was an excess ranging from 0.18 to 3.45, with the greatest at Luling; the deficiency ranged from 0.61 to 2.96 over northern and eastern sections, from 0.57 to 2.98 over central section, and from 0.06 to 3.14 over the coast district and the eastern part of southwest section, with the greatest excess in the vicinity of Houston; the greatest monthly amount, 5.70, occurred at Luling, while none fell at Dean, Midland, and Valentine.—*I. M. Cline.*

Utah.—The mean temperature was 47.0°; the highest was 93°, at St. George on the 16th, and the lowest, 6°, at Koosharem on the 1st. The average precipitation was 0.89; the greatest monthly amount, 3.25, occurred at Pahreah, and the least, trace, at Frisco.—*J. H. Smith.*

Virginia.—The mean temperature was 53.9°, or 2.0° below normal; the highest was 95°, at Farmville on the 23d, and at Bonair on the 25th, and the lowest, 18°, at Monterey on the 20th. The average precipitation was 2.08, or 0.95 below normal; the greatest monthly amount, 4.90, occurred at Guinea, and the least, 0.15, at Bedford City.—*E. A. Evans.*

Washington.—The mean temperature was 51.0°, or 3.4° above normal; the highest was 94°, at Chehalis on the 10th, and the lowest, 18°, at Cascade Tunnel on the 1st. The average precipitation was 1.68, or 1.84 below normal; the greatest monthly amount, 7.61, occurred at Tatoosh, and the least, trace, at Sunnyside.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 51.5°, or about normal; the highest was 90°, at Hewett on the 28th, and the lowest, 19°, at White Sulphur Springs on the 19th and 20th. The average precipitation was 2.97, or slightly below normal; the greatest monthly amount, 7.10, occurred at Philippi, and the least, 1.58, at Bluefield.—*H. L. Ball.*

Wisconsin.—The mean temperature was 43.9°, or 1.5° below normal; the highest was 87°, at Osceola Mills on the 23d, and the lowest, 10°, at Crandon on the 19th, and at Spooner on the 1st. The average precipitation was 2.43, or 0.60 below normal; the greatest monthly amount, 4.89, occurred at Hartland, and the least, 0.10, at Spooner.—*W. M. Wilson.*

Wyoming.—The mean temperature was 42.1°, or 2.0° above normal; the highest was 86°, at Carbon on the 19th, and the lowest, 2°, at Wise on the 4th. The average precipitation was 0.89, or 0.90 below normal; the greatest monthly amount, 1.67, occurred at Sundance, and the least, 0.50, at Green River.—*M. G. Renos.*

RIVER AND FLOOD SERVICE.

By PARK MORRILL, Forecast Official, in charge of River and Flood Service.

The highest and lowest water, mean stage, and monthly range at 118 river stations are given in the following table. Hydrographs for typical points on seven principal rivers are shown on Chart VI. The stations selected for charting are: Keokuk, St. Louis, Cairo, Memphis, and Vicksburg, on the Mississippi; Cincinnati, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

The flood in the lower Mississippi continued throughout April. At Cairo the river remained in high flood during the first half of the month, falling but 2 feet, but during the latter half it declined rapidly and reached the danger line on the 28th. At Memphis there was a very slow but steady fall during the entire month; the total change was only 2½ feet, and the water was still slightly above danger line on the 30th. The stage at Vicksburg was practically constant at its maximum during the latter half of the month, while at New Orleans a very slow but steady rise was still in progress at the close of the month.

At Memphis the height of the river during the present flood exceeded all previous records by 1.5 foot, and that in spite of vast overflows from the river through crevasses in the levees. A considerably higher stage would have been reached had the levees held. The river attained its maximum of 37.1 feet on March 20, at which point its rise was checked through the breaking of the levees near Nodena on the 19th. The rise continued at Cairo for a full week longer, and would probably have lasted at Memphis for ten days, except for the water taken from the river through the crevasses. At the time the levees broke the daily rise was about 0.4 foot.

The river at Vicksburg continued to rise until the 16th, when a stage of 52.3 feet was reached, 1.2 foot in excess of the previous high-water record. At New Orleans a stage of 19.3 feet had been reached at the close of the month, 1.4 foot higher than any water known before.

The Ohio was low during the early part of the month, rose to a good boating stage during the middle of the month, and again fell to a low stage at its close. The Tennessee continued in flood during the first half of April and was the chief agent in maintaining the Mississippi flood. The upper Mississippi was in moderate flood most of the month and the Missouri rose to a flood stage at its close. This resulted in moderately high water at St. Louis, which rose to danger line on the last day of the month.

The following résumé of river stages and conditions of navigation in the respective streams is compiled from reports by the officials of the Weather Bureau at various river stations and section centers:

Hudson River. (Reported by A. F. Sims, Albany, N. Y.)—The Hudson River was at its normal height on the first of the month and so continued up to the morning of the 7th. A 14-inch rise was noted at Albany on the 8th, so that comparatively deep water was to be found along the river front. The river continued to rise steadily during the 9th, and on the morning of the 10th the water was within 2 feet of the stringpiece of the bulkhead. A cold wave over the watershed of the Hudson on the night of the 10th was very effective in checking the flow of surface water, and by the morning of the 11th a fall of 12 inches was noted. The turbidity of the water caused companies pumping from the river to shut down during the first ten days of April.

Much of the rain which fell on the 15th found its way to the river very quickly, so that by the morning of the 16th a 12-inch rise was recorded. The peculiar color of the water points to the occurrence of the heaviest rainfall during the storm over the watershed of the Hoosic River. A gradual rise was experienced up to 8 a. m. of the 17th, when a stage of 7 feet was recorded at Albany. The resultant swift current caused not a little trouble, and many captains experienced difficulty in landing tows. The cold wave on the night of the 19th again checked the flow of water in the feeders of the upper Hudson and caused a gradual fall from the head of navigation south to Catskill, N. Y. By the morning of the 22d the current lessened perceptibly and the condition of the river permitted the commencement of dredging for the season. By the night of the 24th the river stage was once more normal.

Some light snows fell over the Hudson watershed on the morning of the 27th, and a fall of 8 inches was reported from the extreme north portion of the Adirondack section. On the 29th the annual log drive commenced on the Sacondaga River; log driving on the upper Hudson became general on the 30th, and log drivers are preparing to begin operations along the Cedar and Boreas rivers. The output of logs is exceptionally large this year.

Susquehanna River and branches. (Reported by E. R. Demain, Harrisburg, Pa.)—The rainfall for the month was less than normal over the section drained by the Susquehanna River, and consequently the stages of water in all streams of the system averaged lower than usual for this time of year, the average gauge reading at Harrisburg being nearly 2 feet lower than for the same month in the years 1895 and 1896.

The amount of precipitation from the general storm which passed over this section on the 9th averaged about 1.30 inch in the Susquehanna Basin. This caused a general and at most stations quite a decided rise; at Harrisburg the river rose 5.7 feet in three days, the highest point registered being 9.5 feet on the 12th. This flood afforded an excellent opportunity for timber men to get their logs to market and rafting was actively prosecuted during the week, or so, that the river continued high enough to float the timber.

Later rains caused a less important rise in the lower river, amounting to one foot at Harrisburg on the 17th and 18th, after which the river gradually fell and at the end of the month was about 2.5 feet lower than at the close of March.

Rivers of South Atlantic States. (Reported by E. A. Evans, Richmond, Va.; C. F. von Herrmann, Raleigh, N. C.; L. N. Jesunofsky, Charleston, S. C.; D. Fisher, Augusta, Ga.; and J. B. Marbury, Atlanta, Ga.)—The James River held at a low stage during the entire month, there being no rises of any consequence. The rainfall was less than the normal over a portion of the basin drained. In the upper James Valley, where the greater part of the rain fell, previous droughty conditions caused the soil to absorb a large quantity of the water and as a consequence but little was received by the stream. The water was unusually clear for the season. The highest reading recorded at Richmond during the month was 1.6 foot.

None of the rivers of North Carolina reached the danger line during the month of April. The early part of the month, up to the 12th, was comparatively rainy, with heavy precipitation on the 4th and 5th, and 9th and 10th, which during the winter, when the ground is unbroken or frozen, would have caused dangerous floods, but at present, falling on cultivated fields, only caused a slow and not dangerously high rise in the larger streams. The smaller watercourses overflowed their banks twice in the month, without much damage. The dry period at the close of the month brought all the rivers to low stages, and permitted the cultivation of lowlands.

The greatest rise in any of the South Carolina streams occurred at Cheraw on the 6th, resulting from the heavy rainfall over the northwestern portion of the State during the 4th and 5th. The gauge showed 9.5 feet at the 8 a. m. observation of the 5th, with a rise of 2.7 feet for the previous twenty-four hours. The river rose 21.7 feet during the afternoon and night of the 5th and up to 4 p. m. of the 6th, when a gauge reading of 4.2 feet above the danger line was recorded. The oat crop on lowlands was slightly damaged by the overflow. Driftwood was running heavily on the 6th and 7th. The crest of the flood waters passed Smiths Mills on the lower river on the 15th and 16th at a 16.8 foot stage, 0.8 foot above the danger line.

The Wateree at Camden reached the danger line early on the morning of the 6th and on the 7th was 4.6 feet above the danger line. The freshet damaged oats and wheat on lowlands. The drainage from the watersheds of the Broad and Saluda rivers raised the Congaree at Columbia to a stage 0.5 feet above the danger line on the 6th. The Lynch at Effingham rose 0.5 foot per day from the 6th to the 13th, exceeding the danger line by 0.3 foot on the latter date. The Santee at St. Stephens rose rapidly during the 11th to 14th, attaining a gauge reading of 11.5 feet on the 14th. Navigation was uninterrupted on all streams the entire month. The freshets on the upper streams in the early part of the month did not reach the coast region until the 20th. Rice planters were thus enabled to drain and prepare their lands for planting, which has been kept back three weeks.

The steady rain during the early part of April caused a small freshet in the Savannah River during the first ten days of the month, after which the water gradually receded. On the 6th a number of farms in the river bottoms were partially submerged, injuring the grasses that had started on their first growth, but the overflowed land will hardly reach 20 per cent of the entire area under cultivation. A good navigable stage of water was maintained during the entire month. Other sections of Georgia received about the normal amount of rain, and no marked rises occurred in the rivers during the month. There were some heavy rains which caused rises of several feet in the Chattahoochee, Oostanaula, and Flint during the first week, but a steady fall and very little rain is noted during the balance of April.

Mobile River and branches. (Reported by F. P. Chaffee, Montgomery, Ala., and W. M. Dudley, Mobile, Ala.)—Rains during the latter part of March and early in April caused steady but slow rises in the Alabama River and its tributaries during the first ten days of the month, followed by slowly falling waters to the 15th, when well distributed rains occasioned slight rises during the 16th and 17th. Then followed slowly falling waters to the 30th, when general rains over the watershed started another slow rise. As a whole, the month showed a decline in all the rivers of this system, though good navigable stages prevailed during the entire month. Much lowland that had been submerged by the high waters of March was drained off and prepared for crops.

The Tombigbee River and its tributaries continued at good navigable heights to the 20th, when owing to deficient rainfall a decline set in and the headwaters had become quite low at the close of the month. The rains which occurred during the month were mostly light and being rapidly absorbed by vegetation had but little effect on the rivers.

Ohio River and branches. (Reported by F. Ridgway, Pittsburg, Pa.; H. L. Ball, Parkersburg, W. Va.; S. S. Bassler, Cincinnati, Ohio; F. Burke, Louisville, Ky.; and P. H. Smyth, Cairo, Ill.)—For the greater part of the month the water has been too low to admit of coal shipments from Pittsburg. The general rains of the 8th, 9th, and 10th supplemented by the rains of the 15th and 16th, resulted in a good coal-boat stage which continued until the 20th instant. The operators of the upper river mines were thereby enabled to send out for lower ports about 10,000,000 bushels of coal, most of which passed through Pittsburg harbor on the 10th and 11th. The river remained open the entire month, however, for packets and other vessels of light draught and the companies operating such boats report that both freight and passenger traffic were above the average for April.

In the rivers of West Virginia unusually good boating stages existed throughout the month. A period of general and moderately heavy rains occurred from the 4th to the 16th and these caused a rise in all the rivers, but it was not great and did not interfere with navigation. The Ohio at Parkersburg reached its maximum stage, 21.8 feet, on the 12th. From that date until the close of the month the river fell slowly, reaching its lowest stage, 8.5 feet, on the 30th. The Great and Little Kanawa rivers held good boating stages throughout the month and navigation was unimpeded.

Beyond an excellent stage of water during nearly the entire month there was nothing of special importance in the condition of the Ohio River at Cincinnati. After the high waters of February and March the river gradually receded until about the 5th of April when it rose, reaching its maximum height for the month on the 15th. During the remainder of the month there was a steady fall, with indications of an early low-water season. River traffic to the south was almost suspended on account of the floods in the lower Mississippi.

Good stages for navigation prevailed at Louisville throughout the month. The heavy rains of the 8th and 9th caused the stream to swell several feet, the rise lasting to the 10th, after which the stage of water was slowly reduced until the close of the month.

At Evansville the river was above the danger line to the 3d, and from the 11th to the night of the 21st. A steady fall set in on the 19th and continued to the close of the month. At Paducah the river fell during most of the month. On the 18th the river got within its banks, and from then until the end of the month the fall averaged 1.3 foot daily.

At Cairo the river changed but very little during the first half of the month, at times remaining on a stand for one, two, or three days. During the last half of the month a steady fall was in progress, the river getting within its banks by the 28th, after being above the danger line since February 28. In the lower Ohio Valley many thousands of acres of wheat have been drowned out and ruined, and thousands of bushels of corn in cribs have been destroyed. The hay crop has been damaged to no inconsiderable extent. So far as can be ascertained the loss of stock has been small.

The seep water at Cairo, augmented by rain and waste water since the closing of the sewer outlets, reached its maximum stage on the 13th. Nearly all of the graded streets were covered or partly covered, and on many of the streets the sidewalks were several inches under water. A drainage pump, for the southeast portion of the town, was put in operation on the 12th and began to show its good effect by the 14th. By the 21st of the month the graded streets lying southeast of Twenty-first street, were free of water. The streets lying northwest of Twenty-first street were, at the close of the month, still under water in places. A second drainage pump, for the northwest portion, was put in operation on the 24th. All of the ungraded or unfilled portions of Cairo are still submerged at the end of the month.

This spring's flood attained a higher stage than has been reached at Cairo since February, 1884. On February 25–26, 1882, the river stood

at 51.9 feet. During this flood the river was above the danger line from the night of January 13 until the night of April 4. In 1883 the river reached its maximum stage of 52.2 feet on February 26–27; it was above the danger line from February 13 until March 11, from April 8 to April 20, and from April 24 to May 4. In the flood of 1884 the river reached a stage of 51.8 feet on the 21st, 22d, and 24th of February, and was above the danger line from February 7 until March 7, and from March 15 until April 11. The water this spring for the fourth time in thirty years, has reached a stage exceeding 51 feet.

Tennessee and Cumberland rivers. (Reported by L. M. Pindell, Chattanooga, Tenn., and H. C. Bate, Nashville, Tenn.)—Observations on the Tennessee River were discontinued at stations above Chattanooga after March 31. The Tennessee and its tributaries had been moderately low, except at points below Riverton, but began to rise on the 1st of April and continued rising until the 4th. Rockwood and Loudon sent special rainfall reports, showing 2.70 inches of rain at the former and 1.90 inch at the latter station. The river having reached 26.0 feet at Chattanooga by 8 a. m. of the 5th and the information received indicating another freshet, authority was obtained from the Chief of the Weather Bureau to resume full river reports over the system and the river observers at all stations, except Kingston, were instructed by telegraph to resume reports and to report the total rainfall from April 1 up to date. The reports received showed the heaviest rainfall to be along the Clinch and Hiawassee rivers, amounting to 4.71 inches at Kingston and 5.28 inches at Clinton. By the morning of the 7th the rivers were all falling and the special reports were discontinued. The highest water at Chattanooga was 30.8 feet at 6 p. m. on the 6th. After the 6th the river fell steadily, the lowest water for the month occurring on April 30. At Harriman, on the 4th, the Emory River reached 43 feet aud the situation was serious, forcing families to move and doing much damage. The Tennessee did not reach the danger line at any station from the headwaters to Bridgeport, Ala. The river rose at Florence, Ala., until the 10th; at Riverton, Ala., the third rise for the year began on April 3 and continued up to the 11th, when the gauge read 30.1 feet. Navigation was good during the entire month, except during the highest water, when boats did not venture out.

The month opened with the Cumberland River ranging from 6 feet at the headwaters to 16 feet at Nashville and rising slowly. Rain during the first week, especially at the headwaters, put the river at flood tide for the second time this year and produced a rise that for a time promised to equal the flood of the preceding month. At Burnside the river rose 48 feet in the 24 hours ending at 8 a. m. of the 5th and reached a maximum of 58.1 feet. A maximum of 42 5 feet was recorded at Carthage on the 7th and one of 42.3 at Nashville on the 10th. The river gradually subsided from the maximum above indicated and was falling for the balance of the month, except for a slight temporary rise during the last week. Good business was reported by rivermen at all points and the month closes with a favorable stage of water and a general rise at all points.

Mississippi River and minor branches. (Reported by P. F. Lyons, St. Paul, Minn.; M. J. Wright, Jr., La Crosse, Wis.; F. J. Walz, Davenport, Iowa; F. Z. Gosewisch, Keokuk, Iowa; H. C. Frankenfield, St. Louis, Mo.; S. C. Emery, Memphis, Tenn.; R. J. Hyatt, Vicksburg, Miss.; R. E. Kerkam, New Orleans, La.; and C. Davis, Shreveport, La.)—The Mississippi River continued above the danger lme at St. Paul from the 1st to the 18th. Commencing on the 1st with a reading of 15.3, it continued rising until 18.0 feet was attained on the 6th, followed by a gradual and steady fall to the 30th, when the stage was 10.3 feet. The flood at St. Paul and for a considerable distance up the Mississippi and that in the Minnesota River are the first of serious consequence since 1881. Since the beginning of the river service at St. Paul in 1872, the gauge reading of 18 feet was equaled on April 16, 1875; it was exceeded on April 29, 1881, when the extreme stage of 19.7 feet was attained. Aside from some hardship and a little suffering and loss to about 300 families, most of whom were "squatters" on the river flats, no harm resulted. An enormous quantity of logs floated down the river daily up to the 14th, the amount varying from an occasional one to great confused masses which showed the effect of tremendous twisting and squeezing. The ice went out of Lake Pepin on the 5th and opened up the river to St. Paul, but the first boat, the U. S. snag boat *General Barnard*, did not arrive at St. Paul until the 20th.

The Chippewa gorge of ice and logs, which broke the latter part of March and lodged again near the mouth of the river, passed out of the Chippewa and down the Mississippi on the 3d. The material of this gorge continued down the river past La Crosse, and was finally broken up and scattered without doing any serious damage. A large amount of valuable lumber and logs is scattered through the woods below Lake Pepin on account of the water being so high, and most of it will be lost. The flood wave which passed St. Paul on the 6th reached Red Wing the 7th, falling 0.3 foot short of the danger line at that point; it reached Reeds Landing on the 8th, giving a stage of 0.3 foot above the danger line. After the flood crest had passed the river fell steadily the remainder of the month.

At La Crosse the Mississippi was above the danger line during the entire month, the gauge reading ranging from 10.0 feet to 13.7 feet. The crest of the flood wave passed on the 10th, the river having risen rapidly from the 1st to the 10th, and then falling gradually from the 10th to the 30th, the daily fall after the flood wave had passed amounting to 0.2 foot. The river has been too high for good navigation, but there has been considerable activity among steamboat and river men. From the 5th to the 19th the levee from State street to the wagon bridge was covered with several inches of water, and the tracks of the Chicago, Milwaukee, and St. Paul Railroad on Front street were submerged. Water flooded the basements of buildings on Front street. The occupants of buildings along the levee heeded the warnings of the approaching high water, which were issued by the Weather Bureau, and took the precaution to remove from their basements all goods that would be likely to suffer damage. The entire valley of the Mississippi in this vicinity, from bluff to bluff, averaging about 3 miles in width, was overflowed during the greater portion of the month, with the exception of a few high places.

The flood damage from Davenport northward was not very great, although considerable cultivated land was overflowed, because little work had yet been done in preparing the soil or planting crops. Then, as the flood subsided quickly, the water did not remain over the land long enough to injure it or prevent planting this year's crops. These lands are draining off rapidly and most of them will be sufficiently dry for putting in full crops yet this spring. The hay crop, which is the principal one raised on the overflowed lands, will not be injured at all by the overflow and, unless this flood is succeeded by another in May or June, the crop of hay harvested will be as good and as large as in former years.

The entire valley from Tempeauleau to Lansing, 63 miles in length and averaging about 2 miles in width, was overflowed. But in this district there is little land cultivated, it being low and subject to overflow. At Dubuque the water flooded the cellars of the buildings on lower Main street and the lower part of the city; it also flooded the lumber yards and flats, compelling many people of the poorer class to move. Many goods and a large amount of lumber had to be moved. From Clinton to Davenport there was little damage done and very little land overflowed, except islands and a district of some 6,000 or 8,000 acres of very fertile and highly cultivated lands at the mouth of the Wapsipinicon River. The damage here, however, will not be great, as farming operations had not begun and the water will recede and the land dry off in time to raise a crop. At Davenport and vicinity there was little damage done. Several of the large sawmill plants in Rock Island and Moline had to shut down for a short period on account of the high water; the mills in Davenport had not yet started up. Cellars of business houses near the river in both Davenport and Rock Island were flooded to a small extent and goods stored therein had to be moved. One line of railroad running into Davenport was obliged, for a week or so, to abandon its tracks, which enter the city along the levee, but its trains were moved over the tracks of other roads.

The heavy rains at the end of March swelled the Mississippi, already at a high stage, to the danger line at Keokuk by the evening of April 5. Lowlands near the mouth of the Des Moines were slightly overflowed, as well as some very low-lying lands in Clark County, Mo. On the 7th the river had fallen below the danger line and continued falling until the 12th, when the flood from the north began o be felt, and the river again rose to the danger line on the 16th. The water began encroaching on low places in the railroad track between Gregory and Canton, Mo., by the evening of the 18th. Heavy rains throughout southern Iowa, causing a flood in the Des Moines River, also swelled the Mississippi rapidly and by the evening of the 24th trains for St. Louis were abandoned. Alexandria and Gregory, Mo., and the river bottoms in Clark County were flooded back to the hills, making the river from 4 to 6 miles wide. On the 25th the flood from the upper Des Moines reached the mouth of the river, cutting across the land and carrying away part of the railway track north of Alexandria. On the morning of the 27th the Hunt Levee broke, 5½ miles below Warsaw, and a large area of growing wheat was flooded, the first material damage done on the Illinois side. The crest of the flood (18.5 feet) reached Keokuk on the evening of the 27th. The entire lumber district of Keokuk was then covered by from 2 to 4 feet of water. At the end of the month the river, though still at a dangerous stage, was falling rapidly, with a prospect of the flood ending without further damage. At the commencement of the month the Illinois River was still above the danger line, but was falling steadily and the fall continued throughout the month. On April 12 the river was below the danger line at Peoria for the first time in thirty-two days.

Farmers along the Mississippi between Keokuk and St. Louis commenced to remove stock and other movable property from the lowlands at the beginning of the month and preparations were made to protect the levees. On the 1st a levee in the western portion of Hannibal, built to confine the waters of Bear Creek, was overflowed and the Missouri, Kansas and Texas Railroad levee, in the same neighborhood, was carried away. On the 2d the Fox River overflowed the Missouri bottoms opposite Warsaw, and much farm land was submerged. The levee at Fall Creek, a few miles south of Quincy, was broken and several farms were submerged. Opposite Alton, Ill., the water was commencing to encroach upon the lowlands, and by the 5th much wheat land was covered and the crops ruined. Near St. Louis on the 10th the water poured into West Venice, Ill., which is situated

on low land, and the inhabitants used boats in the streets to remove their effects. The lowlands back of East St. Louis were overflowed, the water coming through Cahokia Creek. The town proper is amply protected by railroad embankments up to a stage of about 34 feet. Portions of East Carondelet, Ill., were also flooded.

The second rise of the month in the Mississippi commenced on the 13th and was much more decided than the previous one. It continued until the 28th at Burlington, and was still in progress from Louisiana southward to St. Louis at the close of the month. During this rise the water rose from 3.5 to 6.5 feet above the danger lines at all points from Louisiana northward to Keokuk, and much damage was done, mainly through the flooding of farm lands. The river became 8 miles wide at Quincy and about the same at Burlington, and railroad travel along the west bank was entirely suspended for a number of days. By April 24 about 200 square miles of land were submerged near Hannibal. The Indian Grave levee at Quincy remained intact on account of the continued and persistent work expended upon it. As a rule, the larger cities suffered comparatively little damage, but the smaller towns of Alexandria, Canton, La Grange, and Gregory were completely inundated. On the overflowed farm lands the losses were minimized through the farmers taking advantage of the timely warnings, which enabled them to remove their effects to places of safety. The crops were, of course, ruined, but even in this respect the losses were comparatively small, as the wheat crop was in very poor condition, and the alluvial deposits brought down by the waters will perhaps fully compensate for the loss of this year's small crop. What is most desired now is a sufficient recession of the waters to allow corn to be planted on the overflowed lands; this now seems probable.

Between St. Louis and Cairo the river continued at a high stage the entire month, but at no time was the danger line reached at points above Cairo. From Cairo to Memphis the river was falling most of the month, but, owing to the very slow rate of fall, flood conditions continued throughout April. The levees at Price's Landing, Mo., broke on the night of the 3d, but were repaired during the 4th. From Cairo to Island No. 25, about 155 miles below, both banks of the river have been largely submerged, and, even where the levees held, backwater from the breaks has covered a considerable portion of the counties lying along the river. The overflows this spring have not been as great as in former floods, owing to the fact that levees have been built and strengthened since the last great flood.

The crevasses in the Mississippi levees between Cairo and Memphis are given in the following table:

Place.	Date of break.	Date of measurement.	Width in feet (total).	Estimated depth in feet.
Caruthersville, Mo.	March 18	April 21	3,050	6
Tyler Landing, Mo. (2 breaks)	March 22	April 20	2,630	3
Between Foot of Bullerton and Oceola, Ark. (8 breaks)	Mar. 16-22	April 20	4,060	24
Nodena, Ark., to opposite Fulton, Tenn. (11 breaks).	Mar. 13-14	April 19	8,585	2

Most of the water passing through these crevasses enters the St. Francis River.

On April 1 the river was 10.6 feet above danger line at Cairo, 10.0 feet at New Madrid, 3.4 feet at Memphis, and 7.1 feet at Helena. The decrease in the stage of water at the same points, for the month, was as follows: At Cairo, 13.3 feet; at New Madrid, 9.0 feet; at Memphis, 2.5 feet; at Helena, 5.4 feet; and at Marked Tree on the St. Francis, 4.8 feet. From Cairo to New Madrid the river fell from 0.4 to 0.5 foot daily during the first week, when a slight rise set in, which was felt as far south as Memphis, where a rise of 0.1 foot occurred on the 15th. Except this temporary swell, which lasted only a day or two at any point, the water from Memphis north continued to fall gradually all through the month, the fall during the last week, however, being more rapid. The fall at Memphis was very slow up to the 22d, when the stage had been lowered but 1 foot, and for the following nine days it amounted to 1.5 foot. At Helena the flood reached its maximum on the 4th with a 51.8 foot stage, 7.8 feet above danger line and 3.8 above the highest known stage. A break occurred in the Mississippi State levee on the 4th, which caused the river at Helena to fall about 3.5 feet. The break, which is opposite the mouth of the St. Francis River and on the farm of Mr. F. M. Norfleet, is over 2,000 feet wide, and resulted in the overflow of a large territory from Tunica County south, which embraces some of the most productive cotton lands in this section. On the St. Francis River the maximum stage of 53.4 feet was reached on April 4. At the close of the month the stage of water at points between Cairo and Memphis was slightly above the danger line. The following are the number of days the river has been above danger line at the points named: Cairo, 59; New Madrid, 63; Memphis, 53; and Helena, 50. On April 30 a very narrow strip of land could be seen opposite Memphis for the first time since March 9, a period of fifty-two days.

A crevasse was formed on the Mississippi side of the river on April 21 at Promise Land levee in Issaquena County and another at Biggs levee, about 5 miles below Vicksburg on the Louisiana side, on the 13th. Much valuable farm land was overflowed on both sides of the river and considerable stock and other property lost. The outlook at the end of the month is more favorable, owing to falling water, and efforts will be made shortly to close the crevasses. Some are planting as the water recedes and repairs to the railroad between Memphis and Vicksburg are being made as fast as the water declines. This flood was the most disastrous ever experienced in the Mississippi Delta.

There was a continuous rise in the Mississippi below Vicksburg during the month, all previous flood stages being passed at all points from Vicksburg to the Gulf. The total rise at Natchez amounted to 3 feet, at Red River Landing to 6 feet, at Bayou Sara to 5.5 feet, at Donaldsonville to nearly 4 feet, and at New Orleans to 2 feet. A nearly stationary stage was maintained at Natchez during the last half of the month on account of the Biggs crevasse that occurred on the 16th and overflowed Madison and portions of Tensas and Concordia parishes, thus relieving the stages between Vicksburg and the mouth of the Red. The Glasscock crevasse, 20 miles below Natchez, that occurred on the 19th, aided in maintaining the nearly stationary river above the mouth of the Red.

The bulk of the water from the Biggs-Reid crevasses moved down the Tensas River, Bayou Macon, and the Black River, overflowing the lowlands all along those streams, and the backwater affecting the lowlands of Franklin, Catahoula, and Avoyelles parishes by the close of the month. The swamp lands and hollows of those northeastern parishes hold an immense amount of water, which accounts for the fact that the upper Atchafalaya and extreme lower Red rivers were not materially affected by crevasse water at the close of the month.

The following breaks were caused by the flood: Davis Island on the 12th; Babins Place, one mile below Lafourche Crossing, on the Bayou Lafourche, on the 16th; Reid, 1½ miles below Biggs, on the 19th; Glasscock, 20 miles below Natchez, on the 19th; Coons Landing, on the Tensas front, on the 20th; Melrose, 49 miles below New Orleans (since closed), on the 26th; Guesnard, 400 yards below Melrose (since closed), on the 26th; Cocos, on Bayou des Glaizes (since closed), on the 29th; Home Place, about 58 miles below New Orleans (since closed), on the 29th. The situation is decidedly critical at numerous points below the mouth of the Red at the close of the month, weak places developing daily, and work being constant in strengthening the weak spots and in raising the levees.

At Fulton and above, decreasing stages, for the most part, characterized the Red River. Last month's rains gave a rising stream at Shreveport until the 14th, and at Alexandria until the 20th. The crest of this wave reached 24.1 feet at Shreveport, the highest since August, 1895. Great activity prevailed in river business, it being the first month since last spring during which navigation could be carried on without interruption. The anxiety that was felt last month extended into this, but was quickly allayed by the encouraging reports from the upper river during the first week. The Ouachita declined slowly at Monroe after the 10th, the range for the month being about 2 feet. The upper Ouachita also declined, excepting a rise of about 6 feet from the 14th to 17th at Camden.

Missouri River and branches. (Reported by L. A. Welsh, Omaha, Nebr., and P. Connor, Kansas City, Mo.)—The ice in the Missouri River at Williston passed out on the night of March 31, and the river is reported to have continued clear of ice throughout the month of April, and at the close of the month it was in about its normal condition. The ice gorge above Bismarck broke on the 11th, and the force of the rising water broke up the ice at Bismarck and caused it to run out, no damage resulting from its going out. The ice continued running on the 12th and 13th and the river remained almost stationary. On the 14th the river was reported clear of ice and stationary and all danger of further floods considered past. At Pierre the river was clear of ice until about 9 p. m. of the 7th, when ice began running, and the heaviest run of the season occurred during the ensuing twenty-four hours; floating ice in smaller quantity appeared on the 9th, 10th, and 13th. The ice did not gorge and there was no damage from the flood, except the erosion of banks in some localities. The channel at Crow Creek shifted from the east to the west side of the river, and the channel in front of Pierre also changed slightly, moving from the west side nearer to the center of the river.

On the 10th the river bottoms from Yankton to Sioux City were overflowed with water. No material damage was caused by the high water in that territory, owing to the fact that every possible precaution had been taken to guard against loss. The highest stage of water during the spring was reached at Sioux City on the afternoon of the 11th; the river was bank full and a rise of a very few inches more would have caused great loss to jobbers on the river front, but the river became stationary in the late afternoon and began falling slowly during the night, and all danger of further flood was past at that point.

At Omaha the river rose slowly and steadily from the 1st of the month to the 6th, reaching a stage about three feet below danger line; it remained stationary during the 7th and began to fall slowly on the 8th. It again rose rapidly on the 11th and continued to rise until 6 p. m. on the 15th, when a stage of 17.2 feet was recorded, being 0.8

foot below the danger line. During the night of the 15th the river began falling and continued to fall slowly the remainder of the month. The amount of damage by high water in the vicinity of Omaha was very slight. The greatest damage sustained was by the Arctic and the Swift Ice Companies, whose ice houses are located on the river bottoms in the northern portion of the city.

On the 15th, at St. Joseph, the Missouri was reported to be higher than at any time since 1881, and some damage to railroad property was reported. The Rock Island tracks, opposite Leavenworth, Kans., were reported to be under water on the 15th, but little damage resulted, except delay in traffic and the necessity of sending the trains of that road and the Chicago and Great Western over the Burlington tracks.

At the close of the month the river was below danger line at all points above Kansas City, and all danger of floods in that portion of the river was considered past.

The Missouri, at Kansas City, at the beginning of the month was higher than the average for that time, but 5.4 feet below the danger line. It rose steadily, inundating on the 8th from twenty to thirty shanties erected by squatters on neutral ground in the packing house district at a stage of 20.4 feet, and about eight families located on accretions in the east bottoms. It crossed the danger line on the morning of the 15th, rendering sewers in the west bottoms unserviceable by backwater and causing the packing houses to use pumps. The swift current was also doing considerable damage by cutting banks.

On the 19th the river reached its highest, 22.8 feet, inundating a great portion of Harlem and causing many families to move out. Water was seeping into cellars of wholesale houses in the west bottoms; sewers were plugged in many places to prevent overflow and pumps were also used. Great anxiety was felt, for a greater rise meant not only inconvenience, but a movement of stock from cellars and the shutting down of business in several establishments. From the 19th the water fell, reaching 20.1 feet on the 24th and bringing much relief.

On the latter date, however, a second rise began, chiefly due to the Kaw. Previously the Kaw was well within its banks, but, owing to excessive rains in northern Kansas, where all its tributaries are located, it rose between 4 and 5 feet by the 27th; it carried immense quantities of débris consisting of portions of outhouses, fences, logs, animals, etc. The strong current cut through the Missouri to the Harlem bank and caused even higher water in Harlem than that of the 19th, although the gauge reading at Kansas City was 0.2 lower. Water leaked into a number of cellars in the west bottoms again and continuous pumping again became necessary. It drove from their homes about fifty squatters on the Kansas side, near the mouth of the Kaw. The water backed up some of the sewers in Armourdale and overflowed on the streets. Catch-basins and manholes were plugged with rock and cement to prevent overflow. A large force of men was put to work strengthening and otherwise caring for the Kansas City, Wyndotte and Northwestern Railway bridge which spans the Kaw near its mouth. A tremendous jam, composed of débris, was formed at the bridge and made necessary the removal of part of the trestlework to make an outlet. The western span of the bridge was sprung about 1 foot out of line and the rails twisted in several places. At this time all other railroads were intact at this place, but train service was much interfered with by floods at Leavenworth.

There was quite a rapid fall in the Kaw from the 27th to the close of the month, and a slow but steady fall in the Missouri, which still stood half a foot above danger line on the last day. The Suburban Belt and Santa Fe roads had large forces at work the greater part of the month, riprapping and otherwise protecting the river bank, their lines being close to the river. Farm lands were flooded for 15 miles below Kansas City.

The lower Missouri rose steadily during the first ten days of the month, but below the mouth of the Osage River not materially until the 9th, when the Osage and Gasconade discharges caused a rise of nearly 2 feet at Hermann. This rise in the Missouri checked the fall in the Mississippi, and, as a result, a second rise commenced south of the mouth of the Missouri on the 8th, lasting until the 11th. During the last twenty days of the month the river varied within narrow limits, closing with stages near the danger lines from Boonville westward, but falling steadily.

Arkansas River. (Reported by J. J. O'Donnell, Fort Smith, Ark., and F. H. Clarke, Little Rock, Ark.)—A good, navigable stage prevailed during the month in the upper Arkansas. The river remained about stationary to the 6th, and then rose steadily to 12.8 feet on the 10th; it then fell to 4.2 on the 25th, when, at 4.30 p. m., the rise caused by the heavy rains of the 23d and 24th in the Canadian River Valley began to appear. At 7 p. m. the water was rising 3 feet per hour and the gauge reading was 15.3 at 8 a. m. on the 26th. The river fell to 11.8 on the 29th, when the heavy rains and cloud-burst reported in the Cottonwood and Cimarron valleys in the vicinity and to the west of Guthrie on the 26th and 27th caused a further rise to a stage of 18.2 at noon on the 30th; the river was again falling at 3 p. m. The average stage of 8.7 feet is the highest for April since 1892.

A good boating stage was maintained during the month of April from Fort Smith to the mouth. No damaging floods occurred, although back water from the Mississippi overflowed for a short distance above the mouth. The river did not even approach the danger line at any station; it rose 9.0 feet at Dardanelle on the 27th and 5.2 feet at Little Rock on the next day. This marked rise was caused by heavy rains that fell in the Indian Territory from the 24th to the 28th.

Rivers on the Pacific Coast. (Reported by W. H. Hammon, San Francisco, Cal.; J. A. Barwick, Sacramento, Cal.; and B. S. Pague, Portland, Oreg.)—The rivers of the Sacramento and San Joaquin valleys did not reach any high stages during the month of April. The month was unusually dry. The Sacramento River at Sacramento has ranged between 22.8 feet and 19.9 feet. The Tule basins of Sutter, Yolo, and Solano counties still contain vast bodies of water, but as fast as the water recedes all lands that are tillable are rapidly being planted to late potatoes, beans, and buckwheat. The river has been as usual for April, that is, very uniform in its stages, owing to the steady melting of snow in the mountains.

During the month the increased temperatures prevailing over Washington, Oregon, and Idaho, especially from the 13th to the 18th, caused the Columbia, Snake, and tributary rivers to rise from melting snow. The small streams, which in September are almost dry, rose to a higher point than has been known for a number of years. The Powder River did considerable damage in the vicinity of Baker City. Many miles of track of the Oregon Railway and Navigation Company were washed out and connection with the Union Pacific was broken off for four days. The Willamette River above the falls at Oregon City had a very slight rise. All rises were due directly to the melting of the snow in the lowlands and the foot hills. The rise in the Columbia caused the lower Willamette to back to a height of 18.4 feet on the 23d. At 15 feet the lower docks at Portland are flooded. Timely notice of the rise was given so that all goods, property, and offices were removed from the docks before the water reached them. There was no interference with navigation. Conditions point to a material rise in the Columbia and tributary rivers and consequent backwater in the Willamette at Portland during the next sixty days.

Heights of rivers above zeros of gauges, April, 1897.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.	1,984	14	18.0	6	10.3	30	14.9	7.7
Reeds Landing, Minn.	1,864	12	12.8	8	8.1	30	10.3	4.2
La Crosse, Wis.	1,799	10	13.7	10	10.0	30	11.9	3.7
North McGregor, Iowa	1,789	18	17.6	13,14	11.1	1	14.9	6.5
Dubuque, Iowa	1,679	15	17.9	15	10.1	1	15.0	7.8
Leclaire, Iowa	1,589	10	11.9	17-18	6.5	1	9.8	5.4
Davenport, Iowa	1,573	15	15.1	18	9.0	1	12.7	6.1
Keokuk, Iowa	1,443	14	18.5	27	12.7	12	14.8	5.8
Hannibal, Mo	1,382	17	20.8	29	14.5	13-15	16.4	6.3
Grafton, Ill	1,284	23	22.6	6	13.8	1	20.8	8.8
St. Louis, Mo.	1,241	30	29.9	30	24.0	1	27.5	5.9
Chester, Ill.	1,170	30	26.8	12	20.5	1	24.2	6.3
Cairo, Ill	1,073	40	50.6	1	37.0	30	46.8	13.6
Memphis, Tenn	843	33	36.4	1	33.4	30	35.6	3.0
Helena, Ark	767	44	51.8	4	45.7	30	48.1	6.1
Arkansas City, Ark.	635	42	50.6	1	48.3	30	49.5	2.3
Greenville, Miss	595	40	45.4	1	42.7	30	44.2	2.7
Vicksburg, Miss	474	41	52.3	16	49.2	4-5	51.0	3.1
New Orleans, La	108	16	19.3	29	17.4	1	18.4	1.9
Arkansas River.								
Fort Smith, Ark.	345	22	17.4	30	4.2	24,25	9.8	13.2
Dardanelle, Ark.	250	21	13.7	28	4.2	25	8.5	9.5
Little Rock, Ark.	170	23	14.9	29	6.9	26	10.6	8.0
White River.								
Newport, Ark	150	21	26.4	13	16.7	27	22.1	9.7
Illinois River.								
Peoria, Ill.	135	14	17.3	1	11.2	28	13.5	6.1
Missouri River.								
Bismarck, N. Dak.[a]	1,201	14	23.2	6	5.8	27,28,30	10.7	16.4
Pierre, S. Dak.	1,006	14	12.1	13	6.4	30	7.8	5.7
Sioux City, Iowa	676	19	16.4	15	9.9	29,30	12.9	6.5
Omaha, Nebr.	561	18	17.2	15	11.3	30	14.1	5.9
Kansas City, Mo.	280	21	22.8	19	14.6	1,2	20.1	8.2
Boonville, Mo.	191	20	20.0	29	13.5	1	17.3	6.5
Hermann, Mo.	95	21	15.8	30	12.3	4	13.7	3.5
Ohio River.								
Pittsburg, Pa	966	22	13.5	11	4.0	26,30	7.0	9.5
Davis Island Dam, Pa.	960	25	13.2	11	5.8	26	8.3	7.4
Wheeling, W. Va.	875	36	20.7	11	7.0	27	11.0	13.7
Marietta, Ohio.	795	25	21.2	12	7.9	28	12.3	13.3
Parkersburg, W. Va.	785	25	21.8	12	8.0	28	12.9	13.8
Point Pleasant, W. Va.	708	36	26.0	13	7.9	30	15.5	18.1
Catlettsburg, Ky	651	50	31.3	12,13	10.3	30	21.0	20.5
Portsmouth, Ohio	612	50	32.3	13	12.3	30	22.2	20.0
Cincinnati, Ohio.	499	45	36.2	15	15.1	30	26.3	21.1
Louisville, Ky.	367	24	13.5	16	7.0	30	10.4	6.5
Evansville, Ind	184	30	33.5	17,18	15.3	30	27.6	18.2
Mount Vernon, Ind.	148	35	34.6	18	16.3	30	29.6[†]	18.3
Paducah, Ky.	47	40	47.0	1	24.3	30	38.3	22.7
Alleghany River.								
Warren, Pa	177	7	4.8	15	1.8	5,7	2.7	3.0
Oil City, Pa	128	13	5.2	15	2.5	25	3.5	2.7
Parkers Landing, Pa.	73	20	6.0	10	2.5	6-7	3.9	3.5
Freeport, Pa.	26	20	12.8	10	4.5	25	7.0	8.3
Conemaugh River.								
Johnstown, Pa.	64	7	5.0	9	1.6	25,29,30	2.6	3.4
Red Bank Creek.								
Brookville, Pa.	35	8	2.9	10	0.2	28-30	1.3	2.7
Beaver River.								
Ellwood Junction, Pa.	10	14	4.8	10	0.8	4-5	1.9	4.0

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Big Sandy River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Louisa, Ky	26	20	25.5	6	4.2	5	9.7	21.3
Cumberland River.								
Burnside, Ky	434	50	58.1	5	4.3	25	12.2	53.8
Carthage, Tenn	257	30	42.5	7	5.4	25	17.5	37.1
Nashville, Tenn	175	40	42.2	9,10	9.1	25	22.9	33.1
Great Kanawha River.								
Charleston, W. Va	61	30	9.1	11	4.3	26,27	6.2	4.8
New River.								
Radford, Va	153	14	2.7	6	0.7	27,30	1.3	2.0
Hinton, W. Va	95	14	4.7	7,11	2.1	30	3.0	2.6
Licking River.								
Falmouth, Ky	30	25	17.6	9	2.7	3,4	5.4	14.9
Miami River.								
Dayton, Ohio	69	18	7.1	10	2.0	{3,4,22,25,28,29}	3.1	5.1
Monongahela River.								
Weston, W. Va	161	18	3.6	9	−0.3	30	0.5	3.9
Fairmont, W. Va	119	25	8.1	10	0.9	30	2.8	7.2
Morgantown, W. Va	95	20	13.6	10	7.4	29,30	8.8	6.2
Greensboro, Pa	81	18	13.0	10	7.6	27-30	9.0	5.4
Lock No. 4, Pa	40	28	17.0	10	6.9	30	9.6	10.1
Cheat River.								
Rowlesburg, W. Va	36	14	6.0	10	1.6	28,29	3.2	4.4
Youghiogheny River.								
Confluence, Pa	59	10	6.9	10	1.4	24	2.9	5.5
West Newton, Pa	15	23	7.6	10	1.1	30	2.6	6.5
Tennessee River.								
Knoxville, Tenn	614	29	.....	.....	.....	.....	.....	.....
Rockwood, Tenn	519	20	.....	.....	.....	.....	.....	.....
Chattanooga, Tenn	430	33	30.8	6	5.8	30	12.4	25.0
Bridgeport, Ala	390	24	22.8	7	4.2	28	9.9	18.6
Florence, Ala	220	16	18.3	10	4.2	29	10.4	14.1
Johnsonville, Tenn	94	21	40.1	1	7.2	30	23.1	32.9
Wabash River.								
Terre Haute, Ind	165	16	11.2	14	4.5	23	7.4	6.7
Mt. Carmel, Ill	50	15	19.5	17	8.0	25	14.1	11.5
Red River								
Arthur City, Tex	688	27	9.7	1	3.5	26	6.5	6.2
Fulton, Ark	565	28	25.9	1,2	6.5	30	15.4	19.4
Shreveport, La	449	29	24.1	13,14	14.5	30	21.2	9.6
Alexandria, La	139	33	26.3	15-16	21.5	30	24.5	4.8
Atchafalaya River.								
Melville, La	100*	31	35.7	29,30	33.5	1	34.8	2.2
Ouachita River.								
Camden, Ark	340	39	24.8	18	8.1	30	17.5	16.7
Monroe, La	100	40	37.9	9-12	35.6	30	37.0	2.3
Yazoo River.								
Yazoo City, Miss	80	25	31.5	27,30	26.4	1	29.6	5.1
Tombigbee River.								
Columbus, Miss	285	33	11.7	10	0.2	24,25	5.4	11.5
Demopolis, Ala	155	35	52.4	1	5.9	29	27.7	46.5
Black Warrior River.								
Cordova, Ala	155	20	16.0	10	3.4	29	6.2	12.6
Tuscaloosa, Ala	90	38	29.4	11	5.1	29	16.0	24.3

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Alabama River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Montgomery, Ala	265	35	22.3	11	4.8	29	11.1	17.5
Selma, Ala	212	35	25.0	12	7.0	28-30	14.1	18.0
Coosa River.								
Rome, Ga	225	30	18.9	6	3.2	30	7.1	15.7
Wilsonville, Ala	66	15	10.0	10	3.4	30	5.6	6.6
Tallapoosa River.								
Sturdevant, Ala	69	15	3.8	10	1.8	28,29	2.6	2.0
Savannah River.								
Augusta, Ga	130	32	28.5	6	8.5	29,30	13.1	20.0
Edisto River.								
Edisto, S. C	75	6	5.3	11	3.3	29,30	4.6	2.0
Congaree River.								
Columbia, S. C	37	15	15.5	6	0.9	22	3.6	14.6
Santee River.								
St. Stephens, S. C	50	12	11.5	14	6.8	30	8.6	4.7
Wateree River.								
Camden, S. C	45	24	28.6	7	6.3	28	10.7	22.3
Black River.								
Kingstree, S. C	60	12	7.9	17	4.9	30	6.7	3.0
Pedee River.								
Cheraw, S. C	145	27	30.4	7	3.4	27,28	9.3	27.0
Linch Creek.								
Effingham, S. C	35	12	12.3	13	4.3	29	7.8	8.0
Lumber River.								
Fair Bluff, N. C	10	6	5.3	17,18	2.9	30	4.5	2.4
Waccamaw River.								
Conway, S. C	40	7	4.4	1	1.6	29,30	3.0	2.8
Cape Fear River.								
Fayetteville, N. C	100	38	28.3	7	4.4	30	11.8	23.9
James River.								
Lynchburg, Va	257	18	2.5	7,9	1.0	26,29,30	1.6	1.5
Richmond, Va	110	12	1.6	9	0.1	29,30	0.6	1.5
Potomac River.								
Harpers Ferry, W. Va	170	16	5.0	11	1.5	30	2.6	3.5
Susquehanna River.								
Wilkesbarre, Pa	178	14	.....	.....	.....	.....	.....	.....
Harrisburg, Pa	70	17	9.5	12	3.2	30	5.2	6.3
W. Br. of Susquehanna.								
Lock Haven, Pa	63	10	4.0	10	1.3	5-7,28-30	2.2	2.7
Williamsport, Pa	35	20	8.3	11	2.7	30	4.8	6.1
Juniata River.								
Huntingdon, Pa	80	24	6.7	10	3.8	30	4.5	2.9
Sacramento River.								
Redbluff, Cal	241	23	8.1	17-19	5.8	7	7.3	2.3
Sacramento, Cal	70	28	23.8	22	19.9	1	21.1	2.9
Willamette River.								
Eugene, Oreg	149	10	.....	.....	.....	.....	.....	.....
Albany, Oreg	99	20	.....	.....	.....	.....	.....	.....
Salem, Oreg	69	20	.....	.....	.....	.....	.....	.....
Portland, Oreg	10	15	18.4	23	7.6	5	13.4	10.8

*Distance to the Gulf of Mexico. †Mean for 29 days. •Frozen, 1-4.

SPECIAL CONTRIBUTIONS.

RECENT PUBLICATIONS.

By HERMAN W. SMITH, Librarian, Weather Bureau.

The Chief of the Weather Bureau has directed that there be published regularly in the REVIEW a list of recent publications received by the Library. In the following list the publications, not only of the Department of Agriculture, but of the Government in general, are omitted, as their titles are already accessible to the public through the publications issued by the Superintendent of Public Documents. The present list includes only such other works as seem to bear directly on meteorology and other matters connected with the work of the Weather Bureau. It is to be understood that those who wish to consult these works must do so in Washington, where every convenience for study is afforded.

Austria-Hungary.—Jahrbücher der Königl. Ung. Central-Anstalt für Meteorologie und Erdmagnetismus. Officielle Publication, XXIII Band, Jahrg. 1893. Budapest, 1895. 4to. xix, 169 pp.

Belgium.—Congrès de l'Atmosphère. Organisé sous les auspices de la Société royale de Géographie d'Anvers, 1894. Compte Rendu. Anvers, 1895. 8vo. 272 pp.

Brazil.—Relatorio annual do Instituto Agronomico do estado de Sâo Paulo (Brazil) em Campinas. Vol. VII-VIII, 1894-1895. S. Paulo, 1896. 4to.

British Empire.

Canada.—Twenty-second Annual Report of the Ontario Agricultural College and Experimental Farm. Eighteenth Annual Report of the Agricultural and Experimental Union, 1896. Toronto, 1897. 8vo. xxiv, 309 pp.

England.—Report of the Kew Observatory Committee of the Royal Society for the year ending December 31, 1896. London, 1897. 8vo. 34 pp.

Report of the Meteorological Council of the Royal Society for the year ending 31st of March, 1896. London, 1896. 8vo. 129 pp. 1 map, 10 by 15.

Memoranda of the Origin, Plan, and Results of the Field and Other Experiments Conducted on the Farm and in the Laboratory of Sir John Bennet Lawes, at Rothamsted, Herts. London, 1896. 8vo. 105 pp.

Transactions and Fifth Annual Report of the Council of the Liverpool Geographical Society for the year ending December 31, 1896. Liverpool, 1897. 8vo. 125 pp. 1 plate and 1 chart.

Denmark.—Mémoires de l'Académie Royale des Sciences et des Lettres de Danemark, Copenhague. En Mathematisk Undersogelse af, hvorvidt Vaedsker og deres Dampe kunne have en faelles Tilstandsligning, baseret paa en kortfattet Fremstilling af Varmetheoriens Hovedsaltninger. Ved F. Buchwaldt. Kjobenhavn, 1896. 4to. pp. Del 110-172.

France.—Météorologie Agricole, par F. Houdaille. Paris, n. d. 16mo. 204 pp.

Traité Pratique de Prévision du Temps, par J. R. Plumandon. Paris, 1895. 12mo. 86 pp. 19 charts and 11 tables.

Germany.—Forschungen auf dem Gebiete der Agrikulturphysik. 19 Band, 4 u. 5 Heft. Dr. E. Wollny. Heidelberg, 1896. 8vo. ix, 209 pp. 1 plate.

Russia.—Beobachtungen des Tiflisser Observatoriums im Jahre 1895. (1895.) Tiflis, 1897. 4to. xxix, 198 pp.